

Combining Power and Data Using Powerline Communication for Harness Simplification and Mass Reduction

Completed Technology Project (2016 - 2018)



Project Introduction

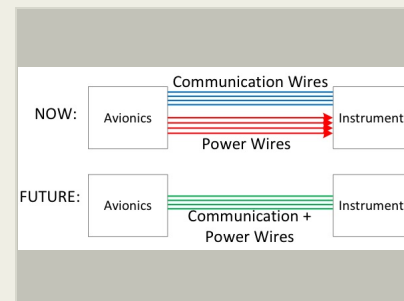
The challenge of this task is to eliminate dedicated communication wires to powered instruments and electronic devices. It will demonstrate realistic data and power transfer over common harness conductors to provide control and telemetry and determine Electromagnetic Compatibility with the power bus and spacecraft environments.

The task approach is to carry communication signals over existing power distribution cables using Powerline Communications Technology and to eliminate all dedicated communications harnessing, resulting in reduction in spacecraft mass, volume and implementation cost. Major milestones: Completed: FY16 - Power bus noise and signal compatibility evaluation. Rates, filtering and protocol determination. Electronic part evaluation and test bed design. In Work: FY17 - Powerline T0 testbed with prototype powerline node and EMI/EMC testing. Radiation testing of potential powerline communication electronics. Preliminary design of an advanced mirror control testbed. Future Work: FY18 - Demonstration of powerline control in relevant EMI/EMC, thermal and vacuum environment (advanced mirror control testbed). Further testing to understand current powerline communication electronics with regard to applicable spacecraft environments.

Anticipated Benefits

This technology provides *Simplified T-zero launch vehicle connections for all spacecraft. *Avionics to instrument power/data interfaces for all spacecraft. *Simplified control of multi-segmented mirrors.

Combining Power and Data using Powerline Communication will provide: *Simplified T-zero launch vehicle connections for all spacecraft. *Avionics to instrument power/data interfaces for all spacecraft. *Simplified control interface for multi-segmented mirrors.



Interface changes due to the use of Powerline Communication on a spacecraft.

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Images	3
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3
Supported Mission Type	3

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

Fred Y Hadaegh

Principal Investigator:

Andrew W Mitchell

Co-Investigators:

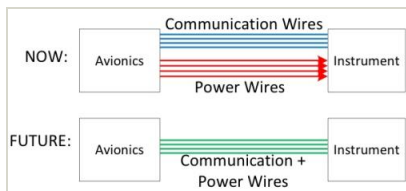
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Images



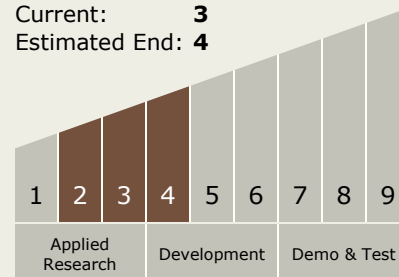
JPL_IRAD_Activities Project Image

Interface changes due to the use of Powerline Communication on a spacecraft.

(<https://techport.nasa.gov/image/27988>)

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - TX11.1 Software Development, Engineering, and Integrity
 - TX11.1.6 Real-time Software

Target Destinations

The Moon, Mars, Others Inside the Solar System

Supported Mission

Type

Push